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Brazil

Grain Transportation and Storage Infrastructure 2005

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Report Highlights:

Brazilian producers of grains and oilseeds in crop expansion areas enjoy significantly lower production costs than their counterparts in the U.S. Midwest. However, transportation inefficiencies result in similar FOB and CIF (Europe) prices for grains. The challenges facing the transportation of grain in Brazil stem from an over reliance on roads as the principal means to move commodities over great distances. Meanwhile, government investment in transportation infrastructure is considered by most to be inadequate, as investment has fallen significantly over the past few decades. One solution to the lack of an adequate transportation and storage infrastructure is public private partnerships that, though somewhat over touted as a solution, could ease infrastructure pressures.

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Grain Production and Transportation Costs

There has been wide coverage both in Brazil and the United States on Brazil's emergence and growth as a global exporter of many agricultural commodities. Brazil is the second largest exporter of soybeans, the 4th largest corn exporter (2004), and ranks in the top five of cotton exporters. This export presence has grown in step with increased production in Brazil's Centerwest region, also known as the cerrado. Traditionally, Brazilian production was located in the south in the states of Parana, Sao Paulo, and Rio Grande do Sul. However, as producers gained knowledge on methods to correct the soil deficiencies of the cerrado, such as aluminum toxicity, and seed varieties were developed for these soils, production began expanding. Today, the states of Mato Grosso, Mato Grosso do Sul, and Goais are agricultural powerhouses with significant acreage still available for expansion. Just 15 years ago production of corn and soybeans in the Centerwest totaled 42.6 million tons while this past year the total reached 98.5 million tons, which represents nearly 40 percent of national production for these commodities. Centerwest producers' competitiveness in grains, oilseeds, and cotton production is mostly attributed to relatively low land costs, cheap labor, and few, though increasing, environmental restrictions. As a result, production costs for most grains are below those in the United States. The chart below details the cost of production in the U.S. Midwest (Illinois), the Brazilian Centerwest state of Mato Grosso, and the southern costal state of Parana.

Soybean Production Costs

(US\$/ha)

	USA Midwest	Brazil Mato Grosso	Brazil Parana
Variable Costs			
Seed	45.3	19.8	30.8
Fertilizer	20.6	119.5	51.7
Agrochemicals	55.9	63.9	74.0
Mechanical Operations	57.2	65.8	47.8
Interest of Capital	5.2	15.6	13.3
Technical Assistance	3.3	12.9	16.9
Other		31.3	28.0
Total Variable Costs	187.5	328.7	262.4
Fixed Costs			
Depreciation of Equipment	126.1	156.6	93.3
Cost of Land	224.1	7.8	40.9
Taxes and Insurance	17.4	4.4	4.6
Return on Farm Investments	37.0	24.5	33.8
Total Fixed Costs	404.7	193.3	172.6
Total Production Costs	592.1	521.9	435.1
Yield (kg) per hectare	2910	3000	3000
Total Costs per Ton	203.5	174.0	145.0

Source: Conab & USDA for 2003/04 crop year

Cost advantages for Brazil are clear, but tremendous transportation inefficiencies are often overlooked and these inefficiencies lead to overall costs in Brazil near those in the United States. The following chart illustrates that high transportation costs diminish much of the benefits from Brazil's low cost of production.

Total Soybean Costs – Including Transportation			
	U.S.	Mato Grosso	Parana
Cost of Production	203.5	174.0	145.0
Freight to Port	26.0	47.0	17.0
Port Costs	3.0	5.3	5.3
Ocean Freight	21.4	23.4	23.4
Total Cost per ton	253.9	249.7	190.7

*Source: Conab

The cost of production in both Mato Grosso and Parana is significantly below that in the United States. Costs are generally higher in Mato Grosso than Parana, which is closer to the coast, due mostly to higher prices for fertilizer that must be transported great distances. With transportation costs included the U.S. Midwest cost is almost even with that of the interior Brazilian Centerwest state of Mato Grosso where most transport is by road with only seven percent of the state's roads paved. As noted, soybean, corn, and cotton expansion is concentrated in Mato Grosso and bordering states, which are plagued with these high Center-West transport costs. The end result of the high cost of transport from the Brazilian Centerwest to ports is that overall profitability in Mato Grosso is almost even with that in the United States.

A second and more recent study performed by the University of Sao Paulo (USP) and USDA/AMS provides a more detailed look at transport costs in Brazil and the United States. Differences in in-land and ocean freight between this study and the Conab chart above can be attributed to more updated information, increases in fuel costs in 2005, and different methods used in computing costs. The table below also demonstrates that the competitive advantages of soybean growers in Mato Grosso over producers in Iowa are lost due to the high cost of transportation. While the farm value of soybeans in Mato Grosso (the largest soybean export state) is nearly \$50 less than in Iowa, the landed cost of Brazilian soybeans in Germany is \$20 greater.

Cost of Transporting Soybeans from U.S. and Brazil to Hamburg, Germany			
(2 nd Quarter 2005 Costs in Dollars)			
	Davenport, IA	Northern Parana	Northern Mato Grosso (Via Paranagua)
Truck	7.82	22.82	79.07
Barge	14.67	0.00	0.00
Ocean	32.81	44.84	44.84
Total Transport	55.30	67.66	123.91
Farm Value	226.81	300.04	177.89
Landed Cost	282.11	367.70	301.80
Transport % of Landed Cost	19.60	18.40	41.06

Source: ESALQ/USP and USDA/AMS

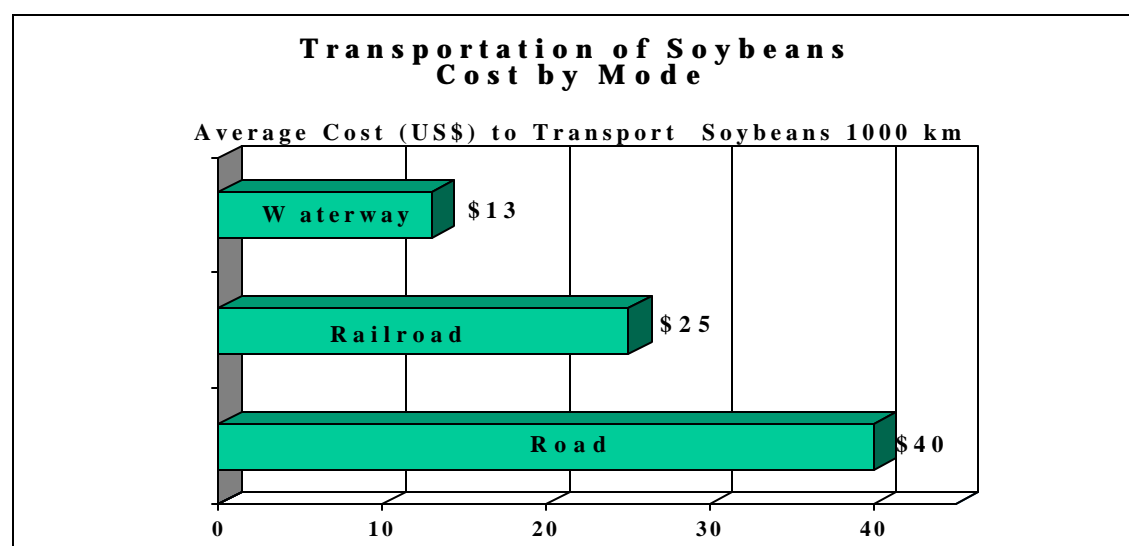
Transportation inefficiencies not only impact export competitiveness but also increase the cost of feed grains for pork and poultry operations which are concentrated in southern Brazil, though production of these meats is expanding in the Center-West. The chart below illustrates how poor interior transportation infrastructure impacts corn prices by region. It is important to note that the price of corn at the port of Fortaleza, Ceara is more than double that in the production area of Sorriso, Mato Grosso.

Regional Difference in Corn Prices (R\$/60 Kg Sack – As of Nov. 11, 2005)		
State		% of Average Brazil Price (R\$14.2)
Southeast		
Sao Paulo	16.5	116
Minas Gerais	14.5	102
South		
Parana	13.5	95
Rio Grande do Sul	17.5	123
Northeast		
Bahia	13.0	91
Ceara	21.0	148
Center West		
Goiias	12.0	84
Mato Grosso do Sul	12.0	84
Mato Grosso	9.0	63

Source: Post

Transportation Logistics

High transport costs that impact Brazil's export competitiveness are largely due to the predominant use of roads to move grain from farms to port. The Brazilian government estimates that roads represent around 67 percent of grain transportation. As the chart below illustrates, road transportation costs are more than triple those of waterway transport and while waterways represent two-thirds of transport of soybeans in the United States, in Brazil two-thirds are transported by road.



Source: U.S. – Ag Marketing Service report "Transportation of U.S. Grains – A Modal Share Analysis"

Roads

Between 65 and 70 percent of the transport of grains in Brazil is by roads, most of which are in poor condition and jammed with trucks during harvests. A recent study by the National Confederation of Agriculture (CNA) shows that the annual loss of grains during road transport is roughly R\$2.7 billion (U.S.\$1.2 billion). The government and private industry recognize the need to rely more on other modes of transport to get grains to ports. However, ironically, a current project is the construction of a new paved road through the Amazon. More precisely, it is the paving of BR163 from Cuiaba, Mato Grosso to the Amazon port town of Santarem, a distance of just over 1,000 kilometers. Such a project might not appear to be an efficient option for getting grains to port but currently soybeans grown in the expanding production areas of Mato Grosso must be trucked over 1,500 miles to the southern ports of Santos, Paranagua, and Rio Grande. Presently, much of BR163 is not much more than a poorly maintained dirt road that becomes mostly impassible in the rainy season. The road is only paved as far as Northern Mato Grosso and projection of a completion date ranges from 4 to 10 years.

While the paving and, perhaps more important, maintenance of BR163 would reduce already very high transport costs, environmentalists fear widespread deforestation along the road as soybean producers and loggers move in. The strong lobby of environmental groups combined with the very high expense and difficulty in constructing the road is likely to cause significant delays in completion, some contacts even doubt that it will ever be finished.

Kilometers of Roads per 1000sq Kilometers of Territory			
United States	Mexico	China	Brazil
447	57	38	26

Source: CNT and Exame

While major road construction projects lag, the government is focusing funds on road maintenance. The 2005 budget for road repair is R\$4 billion but experts suggest that at least R\$12 billion is needed each year to maintain roads in decent condition. The National Confederation of Transportation estimates that 72 percent of roads are in very poor condition. As a result of this poor condition, delays are the norm, repair costs for trucks are reported to be excessive, and accidents are common. In fact, Brazil has more deaths caused by truck accidents than any other country and, according to Paulo Resende of the Dom Cabral Foundation, transport times by road have increased 20 percent in just the past two years.

Rail

Due to the poor state of roads and high maintenance costs, agricultural leaders point to the need for more railroads, as total rail track has not grown in the past 80 years. The rail systems today are inefficient with the average rail speed in Brazil only 25 km per hour, compared to a world average of 75 km per hour. However, there are several projects to improve the rail system. One proposed rail project would connect Rondonopolis and Alto Araguaia in Mato Grosso and would entail laying 260 km of rail at an estimated cost of U.S. \$890 million. The rail line would provide a direct connection from Rondonopolis to the port of Santos and should lead to a dramatic increase in tonnage transported between the two ports. The private and public sectors will finance the project and work could begin this year.

Additional projects in the South and Southeast of Brazil are expected to increase the use of railroads over the next several years. The National Association of Railroad Shippers (ANTF) believes that with improvements to current rail systems and new track laid, by 2008 about 36,000 trucks will be taken off the road in favor of rail transport. The Association also forecasts that 30 percent of all cargo transport in Brazil will be by rail. While these forecasts may be a bit optimistic, improvements to the rail system are likely to increase rail usage in the long term.

Ports and Waterways

The cost of shipping soybeans and corn from Brazilian ports is reported to be about \$8 to \$9 per metric ton, which is considered high relative to shipping costs from Argentine ports. The higher costs are attributed to port tariffs, over-reliance on hand labor, and excessive bureaucracy. Challenges at the port of Paranagua also stem from restrictions on exports of biotech soybeans, while in Santos much needed improvements have been delayed due to environmental concerns. As a result of these problems, private companies are looking to improve ports in Argentina and construct a new port in Uruguay in order to handle soybeans from Bolivia and Paraguay, which are currently shipped out of Santos and Paranagua. Reports suggest that the new port in Uruguay will be able to ship soybeans for just \$3 per ton.

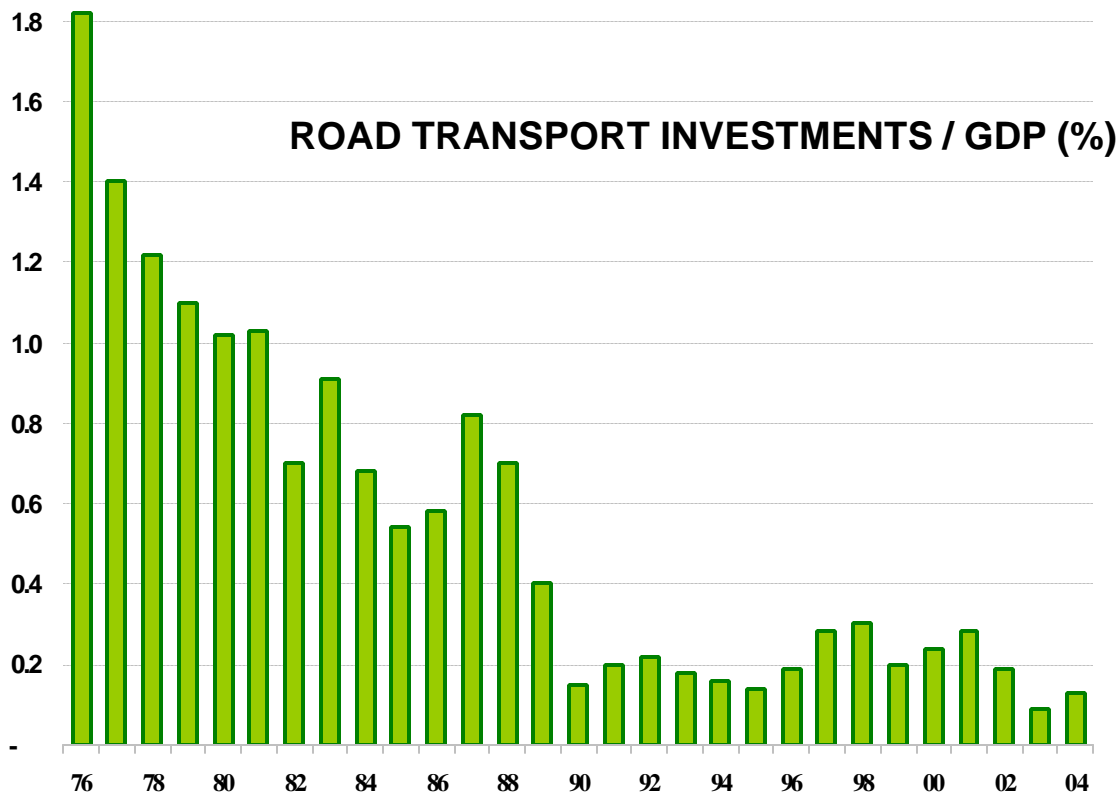
Despite problems at many Brazilian ports, some improvements and additions are moving forward. For example, a new port in the state of Santa Catarina was recently announced in Navegantes. Construction of the port, which will have three berths, is estimated to cost R\$423 million and will be paid for by a group of three private companies. The new port will take pressure off of the port of Itajai, just south of Navegantes. Meanwhile the construction of a grain terminal at Santos is expected to have a storage capacity of eight million tons by 2007. Nevertheless, delays in completion may result in exporting firms moving to other ports as the present situation is reported to be unacceptable due to delays in port dredging and old rail equipment.

Though improvements in ports are slow to be realized transport of soybeans via the Amazon is on the rise. Grain exports via the Amazon river ports of Santarem and Itacoatiara are reported up over 20 percent from last year to around 1.8 million tons. While use of the Amazon to transport soybeans and corn for export has increased, this year there are logistical problems due to low water levels and the channels not being properly dredged, forcing vessels to come out partially loaded.

Government Investment

Despite rapidly expanding production and the transportation inefficiencies detailed in this report, government investment in infrastructure improvements is inadequate. While the GDP grew 4.8 percent in 2004, only R\$2.4 billion was dedicated to transportation infrastructure. Meanwhile, the World Bank recommends that for developing nations that 3.5 percent of GDP go toward transportation infrastructure improvements and maintenance. Current government investment in roads is only 0.1% of GDP compared to 1.8% in the 1970s. Nevertheless, the 2005 transportation budget is R\$6.4 billion but still considered much too low. Some infrastructure projects for 2005 planned by the Ministry of Transportation include the following:

- Completion of 27 river terminals on the Amazon
- Dredging of the Port of Santos from 12 to 14 meters
- Expanding and improving the Northeastern highway linking Plamares and Natal



Public-Private Partnerships

Since government infrastructure investment resources are widely considered inadequate, the government has advanced a program of public-private partnerships (PPP) to improve infrastructure. While significant private funds are likely to be committed to PPPs the government has been slow to provide the details on how such projects will be executed. Though President Lula signed a federal law authorizing PPPs in December of 2004, the government has not yet established the rules and as a result the first PPP contracts are not expected to be signed until mid 2006. Despite the delays there is a tempered expectation among the grain industry that PPPs will accomplish at least some of what the government alone could not, which is to improve an inadequate grain transportation system. It is estimated that R\$35 billion (US\$15.2 billion) will be invested over the next five years in PPPs. Below are the four most important PPP projects, which are currently planned, according to the journalist Roberta Paduan.

- 1) The Northern Railroad of Sao Paulo (R\$600 million): Provides new access for the interior of Sao Paulo and the Center-West of Brazil to the Ports of Sepetiba and Santos and diminishes road transport to Santos from production areas in the Center-West.
- 2) Tapajos-Teles Waterway (R\$420): Would allow for part of the Mato Grosso soybean crop to be exported via the Amazon port of Santarem.

- 3) Paving BR-163 to Santarem (R\$540): When completed will reduce significantly the cost of grain transport via the Amazon.
- 4) Coumba-sepetiba Railroad (R\$1.5 billion): Improve transport of grains from Mato Grosso, Mato Grosso do Sul, and Sao Paulo.

Grain Storage Situation

A recent study by IBGE found that 8.7 percent or 9.3 million tons of grain harvested in Brazil in 2003 was lost during post-harvest storage and transportation. This is primarily due to a lack of sufficient storage space for grains and long distances to ports and population centers. Officials at IBGE believe that this percentage of loss is likely to increase over the next several years given that production is expanding faster than storage capacity. Current total capacity is estimated by IBGE at 72 million tons, compared to 94 million tons estimated by Conab. Total production of grains and oilseeds could be over 130 million tons in 2006. This compares to the United States where storage capacity is estimated at 120 percent of production. Corn in Brazil is most impacted by the storage and transportation inefficiencies due to its low value to volume. Whereas seven percent of soybeans are lost in post harvest operations, nearly 10 percent of corn is lost. Rice supply is also significantly impacted by poor quality storage areas and improperly sealed trucks with the annual loss estimated at one million tons.

Over the past several years grain storage capacity has increased only 10 percent that of grain production with Parana and Mato Grosso most impacted by lack of storage space which has resulted in some producers turning to on-site plastic storage bags. However, the warm and moist tropical climate in these states leads to mold and thus this is not considered a viable option for most producers.